SEI INDUSTRIES

Bambi BUCKET®
Driven by Innovation

BAMBI MAX
(ALL MODELS)
OPERATIONS MANUAL

2013 VERSION B

BAMBI MAX OPERATIONS MANUAL - Version B

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PLEASE READ BEFORE USING.

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Section 1: Introduction to the Bambi MAX

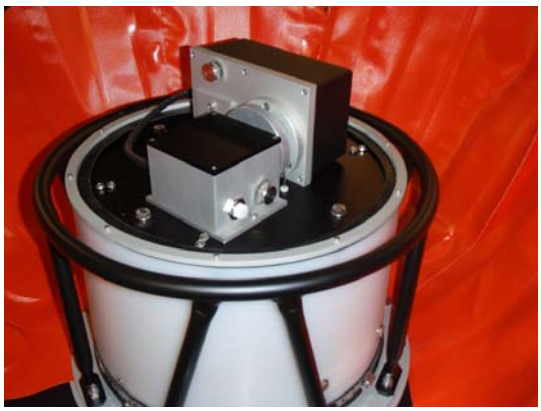
Overview (All Models)

This manual provides helicopter operators with information on the operation of the Bambi MAX as well as for the PowerFill and PowerFill Snorkel systems. For service and maintenance information, please refer to the separate service manual for your specific model number.

Since its introduction in 1983, the Bambi Bucket has become the preferred means of helicopter fire fighting for more than 600 companies and agencies worldwide. This universal industry acceptance is the result of the Bambi Bucket's effectiveness, reliability, simplicity and ease of use. There are several models of buckets available as well as a number of accessories including the PowerFill systems and the Bambi Power Pack.

Bambi MAX inside bucket.

The operation of the Bambi MAX can be quickly mastered by operators with no previous experience and the bucket requires no pre-assembly. Once airborne, the operator can easily become familiar with the flight characteristics of the bucket. Several test fills will also provide familiarity with the variable filling and dumping capabilities of the bucket.



Bambi MAX

Please read this manual prior to flying the bucket, particularly the sections on deploying, filling and dumping. For your own protection, and for longer bucket life, always read the instructions and warnings. Ignoring these warnings could result in personal injury, bucket damage or aircraft damage.

SEI Industries Ltd. offers complete parts supply and repair services for the Bambi MAX. For a repair facility in your area, please contact SEI. For maintenance and repair purposes, parts diagrams and descriptions are provided in a separate service manual (specific to your model). When ordering parts, please provide the model and serial number of your Bambi MAX.

For more copies of this manual, please contact SEI or visit our website at www.bambibucket.com for more information on these products.

Section 2: Preflight Safety Check

Safety Checklist

Along with the aircraft, the Bambi MAX should also receive a preflight inspection each day. Follow the checklist below, beginning at the bottom of the bucket and working upwards.

1. Check the bottom chain looking for any tears in the fabric straps. Also, check the lockwire or tie wraps on the shackles.
2. Check for loose bolts around the bucket shell; IDS brackets at the top, the wear strips at the bottom and bottom rings.
3. Check the diagonal M-straps that connect the suspension cables to the top of the bucket, looking for signs of wear or incorrect suspension line connections.
4. Check the suspension cables for frays, kinks or loose swages.
5. Check that the ballast is securely attached. Full ballast is essential for safe operations.
6. Check the head for secure shackles.
7. Once the Bambi MAX is hooked-up to 28V power, activate the valve several times to ensure that the hook-up is correct.
8. If a PowerFill system is installed, inspect the conductor wires for damage, chaffing or wear. Confirm that the conductor cables are firmly secured.
    - For PowerFill Snorkel, the wires should be attached to the nearest suspension line.
    - For PowerFill (internal), the wires are attached to the IDS deployment cable.
    - If a long line is used, the wires should be attached to this line also.

Warning

Do not operate with damaged cables. Damage to an electrical cable, that leaves the conductor exposed, can result in a fire if it comes in contact with another conductor or metal object.

9. Repair any damage to the components above before operating.
10. Inspect the cable connectors for damage and ensure proper connections.

Warning

Do not put your fingers or other objects into the pump impeller while the pump is running. Personal injury or damage to the pump can occur.

11. With power on, check the function of the pumps by pressing the pump's ON button for four or five seconds. The pump should turn on and run for the period the button is held. The pump will be audible within a few feet of the bucket. Listen for abnormal noises that are not consistent with smooth operation. If you are operating in a noisy environment, you can confirm that the pump is running by holding your hand on the top of the filter screen. You may also see the shell move each time you activate the switch.
12. Check the filter screen for debris accumulation and clear as necessary.
13. Check the filter screen for signs of damage that may affect water flow.

Section 3: Deploying the Bambi Bucket

Deployment Instructions

Attaching to the Cargo Hook

Caution

The Bambi MAX may not be suitable for a direct hook-up to the cargo hook. The actual hook-up will be different for various aircraft and operators must comply with all instructions and bulletins supplied by the aircraft manufacturer. It is the operator's responsibility to ensure that the Bambi MAX is correctly fitted to the helicopter.

Head Orientation

The Bambi MAX is rigged for a longitudinal cargo hook. Correct attachment is indicated when the ballast on the Bambi faces forward in flight.

Caution

It is important that the ballast faces forward in flight. This will avoid twisting of the suspension lines.

For this style of head, if using a swivel hook, always operate in the locked position to assure that the ballast is always facing forward in flight.

Connecting Power

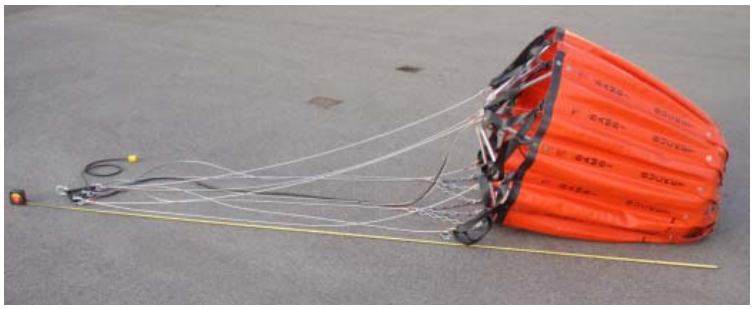
The Bambi MAX's electrical supply is connected through a breakaway plug. The purpose of the plug is to offer a clean "breakaway" if the Bambi MAX has to be jettisoned from the aircraft in an emergency. If the control cable is not secured to the longline, duct tape should be wrapped every 24-36" to prevent any damage to the cable.

Checking Suspension Cable Length

Warning

Using a Bambi bucket with a greater overall length than the distance from the cargo hook to the front tip of the tail rotor on your helicopter could result in a tail rotor strike and possible loss of control of the helicopter which could result in injury or death.

Overall lengths of Bambi MAX buckets with standard rigging are provided on the next page of this manual. Before using the Bambi MAX bucket, check for the maximum total length. To determine this length, measure the distance from the cargo hook to the front tip of the tail rotor on the helicopter you will be using and subtract 6" (152 mm). To determine overall bucket length:



Measuring the bucket.

1. Stretch out the bucket on the ground, pulling the suspension cables taut.
2. Measure the distance from the shackle on the head to the bottom of the shell. This measurement should be less than the maximum total length as determined with the chart on the next page.

Overall Lengths with Standard Rigging

Bambi Max Model	Overall Length		PowerFill Lengths	
	Feet	Meters	Feet	Meters
BBX1518	13’ 5”	4.08	No Change	
BBX1821	13’ 7”	4.14		
BBX2024	16’ 7”	5.05		
BBX2024S	12’ 4”	3.76		
BBX2226	13’ 0”	3.96		
BBX2732	19’ 11”	6.07		
BBX2732S	12’ 2”	3.71		
BBX3542	20’ 9”	6.32		
BBX4453	23’ 8”	7.21	24’ 2”	7.36
BBX5566	24’ 7”	7.49	25’ 1”	7.64
BBX6578	25’ 1”	7.63	25’ 3”	7.66
BBX7590	30’ 6”	9.30	31’ 0”	7.78
BBXHL4000	31’ 8”	9.65	32’ 4”	9.80
BBXHL5000	32’ 0”	9.75	32’ 6”	9.90
BBXHL7600	33’ 1”	10.08	33’ 7”	10.23
BBXHL9800	34’ 3”	10.44	34’ 9”	10.59

Note: Specifications subject to change. Lengths are accurate to within 1%.

Important Note

A) Always measure the overall extended length of your Bambi bucket.

and

B) Measure the distance from the belly hook to the closest possible point on the tail rotor.

"B" must always exceed "A" by at least six (6) inches.

Important Note

It is recommended that operators, who choose to use the Bambi bucket with a longline, ensure that the longline is at least 50’ long.

Shorter Suspension Cables

If the overall length of the Bambi bucket exceeds the distance from the cargo hook to the front tip of the tail rotor of the helicopter, shorter suspension lines and deployment lines must be used and can be ordered from SEI. Please specify the model and serial number when ordering parts.

Instant Deployment System (IDS)

The instant deployment system uses a hub and spoke mechanism to automatically expand the mouth of the bucket as soon as the weight of the Bambi MAX is taken up by the suspension cables.

Correct IDS position.

When the bucket is full, the IDS deployment cable and hub restrainer cables should be slack as they should not bear any load.

Their function is to position the hub and spoke mechanism to hold the bucket open.

To deploy the IDS on the ground, reach into the bucket, grasp the hub of the IDS and pull outward fully until the two restraining cables from the hub to the lower bucket shell are tight.

The IDS is normally set to the last chain link by the factory which is its correct position but, if the bucket has been worked on by other people, it may have been accidentally positioned wrong. Corrections can be made by returning it to its correct position.

The main parts of the IDS are illustrated in a separate service manual.

Section 4: Flight Operations

Flying the Bambi MAX

The Bambi MAX should be flown in accordance with the United States Forest Service recommendations limiting all helicopters, other than tandem rotor, to a maximum 80 KIAS while conducting external cargo hook operations.

The recommended never exceed speed (VNE) for the Bambi MAX is 80 KIAS, however, this is not a flight manual limitation. Speeds above 80 KIAS should be approached with caution and any decision to exceed this speed should be based on flight characteristics, aircraft flight manual limitations, aircraft/bucket configuration and load stability, etc.

Any change that exceeds our recommendation should be formally authorized in your company's external load specifications.

A suggested flight procedure is to build up speed slowly with the Bambi MAX, under prevailing conditions, to determine a safe maximum flying speed.

Flying a Bambi bucket with the PowerFill system will not adversely affect the flight characteristics of the bucket.

The dead weight of the load ensures different handling characteristics than when flying empty. As a result, the Bambi MAX does not 'pulse' or 'throb' under load in flight.

Important Note

Bambi MAX buckets can operate in any atmospheric conditions where icing conditions are not present. If icing conditions are encountered during operations, in flight or on the ground, SEI cannot guarantee the reliable operation of the valve actuating mechanisms nor related components.

Operating the Bambi MAX at 0°C or below may have adverse effects on the operation of the bucket and also to the fabrics used in its manufacture. Please refer to this manual for information related to proper storage.

Filling the Bambi MAX

Once the Bambi MAX touches the water surface, it immediately tips and sinks. This is a result of the ballast on one side of the bucket which makes it unstable on the water. Opening the valve will make the bucket sink faster but it should be closed once it is below the surface.

Warning

When filling the Bambi MAX, do not execute an abrupt 90 degree pedal turn with the helicopter close to the water while towing the bucket. While filling, there is a danger that the Bambi MAX suspension lines (as with any other external load) could get caught on a rear skid resulting in a dynamic rollover on liftout. This could cause personal injury and helicopter damage. Check the load and suspension cables with your mirrors before liftout.

To fill the bucket from an open top tank, you will require a tank with a recommended depth as shown in the chart below:

Bambi Max Model	Bambi Height		Required Tank Height	
	Inches	Metric	Inches	Metric
BBX1518	39”	1.00	48”	1.22
BBX1821	41”	1.04	56”	1.45
BBX2024	43”	1.09	58”	1.52
BBX2226	44”	1.10	60”	1.52
BBX2732	48”	1.22	60”	1.52
BBX3542	57”	1.45	78”	2.04
BBX4453	57”	1.45	78”	2.04
BBX5566	62”	1.57	84”	3.05
BBX6578	67”	1.70	90”	3.05
BBX7590	73”	1.85	96”	3.05
BBXHL4000	75”	1.90	96”	3.05
BBXHL5000	80”	2.03	110”	3.05
BBXHL7600	95”	2.41	120”	3.05
BBXHL9800	106”	2.70	120”	3.05

NOTE: This table does not apply if you are using a PowerFill system. In that case, a water depth of 18" (46cm) can be used to fill the bucket.

Filling the Bambi MAX with the PowerFill System

Initiating a fill with the PowerFill is simple and can be quickly mastered. Operation of the pump(s) is accomplished by simply pressing the fill button for as long as it takes to fill the bucket. There are a few key points to keep in mind:

- To initiate a fill, the pump impeller must be immersed. It may not be possible to fill from water sources less than 18" (46cm) deep.
- Once a fill has been started, the bucket will need to be supported by maintaining some tension on the suspension lines, particularly when the bucket is nearly full. If the bucket is not supported, the flexible nature of the bucket shell may allow it to collapse to one side as the water load increases.
- Once a fill has been started, the bucket can be raised or lowered, relative to the water line, without losing the prime.
- Frothing of the water or slow fill rate indicates the pump is not submerged for enough to maintain prime.
- The further the bottom of the bucket can be lowered into the water source, the faster the bucket will fill.
- Where possible, employ a partial dip fill, augmented by the pump, to reduce the total fill time.
- It is recommended that the pump not be run when a conventional dip fill is possible.
- Do not run the pump if it is submerged to a depth of 10 feet (3 m) or more.
- Do not submerge the bucket to a depth of more than 20 feet (6.1 m) when performing conventional dip fills (pump off) in deep water sources.
- The filter screen is designed to filter out objects large enough to damage the pump impeller and to prevent weeds and debris from clogging the pump intake. If operating the pump in extremely dirty or swampy water sources, more frequent inspections of the pump impeller and filter screen may be required to maintain optimal function.
- The pump can be run dry without damage. However, maximum life can be obtained from the pump motor if the run time is limited only to filling the bucket. Excessive run time will require more frequent lubrication of the pump output shaft. See the service manual for the lubrication procedure.

Variable Fill Capability

In some areas, fire conditions require the reduction of bucket loads to accommodate weight restrictions caused by high elevation operations. The Bambi MAX has a gated valve system that allows the pilot to reduce the bucket load. By pressing and releasing the dump switch as the bucket is being pulled from the water, the bucket weight can be reduced until the desired load is reached as indicated by a load cell or torque gauge. As little as 2% can be shed in this manner.

Dumping the Bucket

Introduction

To dump water from the bucket, push and hold the dump switch. As long as the switch is held, water will flow from the bucket. Release the switch to stop the flow of water.

The valve may be opened and closed an unlimited number of times allowing the water load to be split into as many parts as desired.

Important Note

If the valve fails to operate, it may be due to a jammed condition in the bucket which caused the internal motor protection to trip. To reset, turn off the power to the bucket circuit, wait for 10 seconds and then turn the power back on, and attempt to operate the valve. If the problem continues, investigate the cause of the jammed condition.

Dump Pattern

The dump pattern is affected by height and airspeed. It is most concentrated at lower altitudes and at a hover. The pattern will spread with height and speed. Most operators take advantage of these characteristics to maximize their assault on the fireline.

Warning

Ensure that ground personnel are clear from the dumping zone. Failure to do so could result in serious personal injury.

Dump Speed

Make dumps at slower speeds before progressing to faster dumps to get familiar with the flight characteristics, while dumping, from your particular helicopter.

Landing

The recommended landing procedure is to allow the bucket to touch down ahead of the helicopter and then maintain tension on the suspension lines by backing up slightly. Do not drag the Bambi MAX over rough surfaces when landing or ground handling. This will damage the bucket shell.

Caution

When the Bambi MAX is taken out of daily operation, leave the valve partially open which will extend the life of the seal.

Section 5: Packing and Storage

Packing and Storing

Important Note

Always leave the valve open 1 to 2 inches as this prevents the bottom seal from collapsing during long periods of storage, leading to longer seal life.

Packing the Bucket

1. Collapse the IDS by pushing the hub into the bucket.

2. Grab the head and pull the suspension lines taut. Tape the lines together in two bunches.

3. Insert the operations manual into the storage bag.

4. Gather the suspension lines into a coil and stow inside the bucket. Place the head outside of the bucket to prevent the possibility of the lines tangling.

5. Place the head on top of the collapsed bucket.

6. Roll the bucket into a bundle and wrap with straps supplied.

7. Rotate shell until head is under the shell.

8. Take the carrying bag and drape it over the bucket.

9. Roll the bucket over and insert the manual.

10. Close with zipper and store with label showing.

The Bambi MAX carrying bag makes a suitable shipping container when shipping via airfreight. Because of the compactness of the Bambi, many operators carry it aboard the helicopter, at all times, during the fire season. This allows for rapid deployment when required.

Section 6: Specifications and Parts

Capacity and Weight Specifications

Bambi MAX Specifications

Bambi Max Model	Capacity			Gross Weight		Empty Weight	
	Imp Gal	US Gal	Liters	lb	kg	lb	Kg
BBX1518	150	180	680	1590	722	93	42
BBX1821	180	210	820	1850	840	103	47
BBX2024	200	240	910	2140	969	138	62
BBX2024S	200	240	910	2140	969	135	61
BBX2226	220	260	1000	2300	1040	135	61
BBX2732	270	320	1200	2810	1280	145	66
BBX2732S	270	320	1200	2810	1280	140	64
BBX3542	350	420	1600	3650	1660	152	69
BBX4453	440	530	2000	4630	2100	216	98
BBX5566	550	660	2500	5770	2620	268	122
BBX6578	650	780	3000	6840	3100	346	157
BBX7590	750	900	3400	7860	3560	357	162

Bambi MAX with External PowerFill Snorkel Specifications

*Not available on models 1518 and 1821.

Bambi MAX	Optimal Fill Time (Sec.)	Capacity			Gross Weight		Empty Weight	
		IMP Gal	USG Gal	Liters	lb	kg	lb	kg
BBX2024	34	200	240	910	2190	990	184	83
BBX2024S	34	200	240	910	2190	990	181	82
BBX2226	38	220	260	1000	2350	1060	181	82
BBX2732	45	270	320	1200	2860	1300	191	87
BBX2732S	45	270	320	1200	2860	1300	186	85
BBX3542	59	350	420	1600	3710	1680	198	90

Bambi MAX with Internal PowerFill Specifications

* Two or four pumps at 450 GPM.

Bambi MAX	Optimal Fill Time (Sec.)	Capacity			Gross Weight		Empty Weight	
		IMP Gal	USG Gal	Liters	lb	kg	lb	kg
BBX4453PF	35	440	530	2000	4730	2150	314	143
BBX5566PF	44	550	660	2500	5870	2670	366	166
BBX6578PF	52	650	780	3000	6940	3150	444	202
BBX7590PF	60	750	900	3400	7960	3620	455	207
BBXHL4000PF	37	880	1100	4000	9320	4240	566	257
BBXHL5000PF	50	1100	1300	5000	11400	5180	586	266
BBXHL7600PF	76	1700	2000	7600	17300	7680	656	298
BBXHL9800PF	98	2200	2600	9800	2240	10200	726	330

Note: Capacities and weights are accurate to within 5%. Specifications subject to change.

Caution

The selection of a Bambi bucket model for a specific aircraft is dependent on many factors including aircraft weight, fuel weight, operation elevation and atmospheric conditions.

The helicopter operator must select a bucket model which is appropriate for their specific situation.

The operator must also ensure that the bucket selected does not pose a tail rotor strike hazard.

Section 7: Warranty

SEI Industries Ltd. (the company) agrees to grant a warranty for a period of one year from the date of purchase of Bambi bucket systems on the following conditions:

a) The company's sole obligation under this warranty is limited to repairing or replacing, at the company's sole discretion, any product shown to be defective.

b) The company's products are not guaranteed for any specific length of time or measure of service, but are warranted only to be free from defects in workmanship and material for a period of one year to the original purchaser.

c) To the extent allowable under applicable law, the company's liability for consequential and incidental damages is expressly disclaimed. **The company's liability in all events is limited to and shall not exceed, the purchase price paid.**

d) This warranty is granted to the original purchaser of Bambi bucket systems and does not extend to a subsequent purchaser or assignee.

e) The company must receive notification in writing of any claims of warranty from the original purchaser which must give details of the claimed defect in the product.

f) Where the original purchaser is claiming under warranty, the product must be returned to the company for inspection with all transportation and duty charges prepaid.

g) The warranty does not extend to any product that has been accidentally damaged, abraded, altered, punctured, abused, misused or used for a purpose which has not been approved by the company.

h) This warranty does not apply to any accessories used with the product that are not supplied by the company and any warranty on such accessories must be requested from the manufacturer or dealer of the accessories.

i) In the event the original purchaser does not give notice of a warranty claim, within one year of the original purchase of the product, it is understood that the purchaser has waived the claim for warranty and the purchaser and/or any subsequent purchaser must accept the condition of the product, without warranty.

j) Any technical information supplied by the company regarding the product is not a condition of warranty but rather is information provided by the company to the best of its knowledge.

k) There are no implied warranties nor is there any warranty that can be assumed from any representation of any person, except the company itself.

Exclusions

l) This warranty is void if the product is not installed, used and/or maintained in accordance with the operations manual supplied by SEI.

m) All Bambi buckets are designed and manufactured with substantial safety margins. It is the responsibility of the user to ensure that the bucket is maintained to a safe standard.